

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

RUNGE et al.

)  
) Applications

Serial No. Not Assigned

Filed:

For: A PROCESS FOR PRODUCING DRY POWDERS OF ONE OR MORE  
CAROTENOIDS

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Sir:

Prior to examination, kindly amend the above-identified application as follows.

IN THE CLAIMS

Please amend the claims as shown in the attached sheets.

REMARKS

The claims have been amended to eliminate multiple dependency. No new matter has been added. A clean copy of the claims is attached.

Entry of the above amendment is respectfully solicited.

Respectfully submitted,

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**CLEAN VERSION OF AMENDED CLAIMS OZ 52141**

5. A process as claimed in claim 1, wherein at least one partially degraded soybean protein with a degree of hydrolysis of from 0.1 to 20% is used as protective colloid.
6. A process as claimed in claim 1, wherein the carotenoids used are oxygen-containing carotenoids.
10. A carotenoid-containing dry powder obtainable by a process as defined in claim 1.
12. A dry powder as claimed in claim 10, comprising oxygen-containing carotenoids selected from the group consisting of astaxanthin, canthaxanthin, lutein, zeaxanthin, citranaxanthin and ethyl  $\beta$ -apo-8'-carotenoate.
15. The use of the carotenoid-containing dry powders as defined in claim 10 as addition to human foods, pharmaceuticals and/or animal feeds.

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**MARKED VERSION OF AMENDED CLAIMS OZ 52141**

5. A process as claimed in claim 1 [any of claims 1 to 4], wherein at least one partially degraded soybean protein with a degree of hydrolysis of from 0.1 to 20% is used as protective colloid.
6. A process as claimed in claim 1 [any of claims 1 to 5], wherein the carotenoids used are oxygen-containing carotenoids.
10. A carotenoid-containing dry powder obtainable by a process as defined in claim 1 [any of claims 1 to 9].
12. A dry powder as claimed in claim 10 [either of claims 10 or 11], comprising oxygen-containing carotenoids selected from the group consisting of astaxanthin, canthaxanthin, lutein, zeaxanthin, citranaxanthin and ethyl  $\beta$ -apo-8'-carotenoate.
15. The use of the carotenoid-containing dry powders as defined in claim 10 [any of claims 10 to 14] as addition to human foods, pharmaceuticals and/or animal feeds.

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**CLAIMS AS FILED - OZ 52141**

1. A process for producing dry powders of one or more carotenoids by
  - a) dispersing one or more carotenoids in an aqueous molecular or colloidal solution of a mixture of lactose and a protective colloid and
  - b) converting the dispersion which has formed into a dry powder by removing the water and, where appropriate, additionally used solvents and drying, where appropriate in the presence of a coating material,wherein at least one soybean protein is used as protective colloid in process step a).
2. A process as claimed in claim 1, wherein the dispersion step a) comprises the preparation of a suspension of one or more carotenoids in an aqueous molecular or colloidal solution of a mixture of lactose and at least one soybean protein.
3. A process as claimed in claim 2, wherein the suspension prepared in process step a) is ground before conversion into a dry powder.
4. A process as claimed in claim 1, wherein the dispersion in stage a) comprises the following steps:
  - a<sub>1</sub>) dissolving one or more carotenoids in a water-miscible organic solvent or in a mixture of water and a water-miscible organic solvent or
  - a<sub>2</sub>) dissolving one or more carotenoids in a water-immiscible organic solvent and
  - a<sub>3</sub>) mixing the solution obtained as in a<sub>1</sub>) or a<sub>2</sub>) with an aqueous molecular or colloidal solution of a mixture of lactose and at least one soybean protein,

**CLAIMS AS FILED - OZ 52141**

resulting in the hydrophobic phase of the carotenoid as nanodisperse phase.

5. A process as claimed in claim 1, wherein at least one partially degraded soybean protein with a degree of hydrolysis of from 0.1 to 20% is used as protective colloid.
6. A process as claimed in claim 1, wherein the carotenoids used are oxygen-containing carotenoids.
7. A process as claimed in claim 6, wherein the oxygen-containing carotenoids are compounds selected from the group consisting of astaxanthin, canthaxanthin, lutein, zeaxanthin, citranaxanthin and ethyl  $\beta$ -apo-8'-carotenoate.
8. A process as claimed in claim 7, wherein
  - a) astaxanthin and/or canthaxanthin is dissolved in a water-miscible organic solvent or a mixture of water and a water-miscible organic solvent at temperatures above 30°C,
  - b) the resulting solution is mixed with an aqueous molecular or colloidal solution of a mixture of lactose and a partially degraded soybean protein with a degree of hydrolysis of from 0.1 to 20%, and
  - c) the dispersion which has formed is converted into a dry powder.
9. A process as claimed in claim 8, wherein astaxanthin is used as carotenoid.
10. A carotenoid-containing dry powder obtainable by a process as defined in claim 1.
11. A dry powder as claimed in claim 10 with a carotenoid content of from 0.1 to 30% by weight.

**CLAIMS AS FILED - OZ 52141**

12. A dry powder as claimed in claim 10, comprising oxygen-containing carotenoids selected from the group consisting of astaxanthin, canthaxanthin, lutein, zeaxanthin, citranaxanthin and ethyl  $\beta$ -apo-8'-carotenoate.
13. A dry powder as claimed in claim 12, comprising 5 to 20% by weight of astaxanthin.
14. A dry powder as claimed in claim 12, comprising 5 to 20% by weight of canthaxanthin.
15. The use of the carotenoid-containing dry powders as defined in claim 10 as addition to human foods, pharmaceuticals and/or animal feeds.